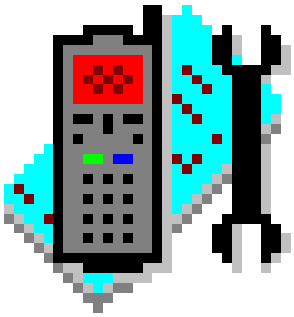
Programmes After Market Services



WinTesla Users Guide

NHP–4

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Tesla for Windows Operating System

The name **TESLA**, when used by Nokia, is an acronym for **TE**st and **S**ervice **L**ocals **A**pplication. Tesla for WIndows (i.e. WinTesla) is a software package designed to operate in the Microsoft Windows environment. The software package is made of two modules, the Wintesla core module and a service software module. The Wintesla module is similar to an operating system for various service modules. In this way many Nokia products can be serviced using one common software package, running different service modules (in this case, for the Nokia 2170).

Note: The Wintesla core module MUST be installed for "any" service module to run.

Installing WinTesla On Your Hard Disk

The WinTesla core software is delivered on a 3.5" diskette and is protected with a protection key (PKD–1, commonly referred as the "dongle") which must be attached to the parallel port LPT 1 when the WinTesla service software is being used.

To install the WinTesla core software package, proceed as follows:

***NOTE**: For instructions on installing the HD891 service module (see **Installing the HD891 Service Module**)*

Insert the WinTesla Application diskette into drive A: of your PC.

From DOS (NOT running windows) type
`A: INSTALL <Enter>` (Windows will boot up automatically)

Or

From Windows File Manager double click the mouse on
`a:\install.exe`

Follow the instructions given and use the *new* option when requested.

Repeat this procedure for the required module installation using the *upgrade* option instead of *new*.

***NOTE:** For interim WinTesla releases use the **upgrade** option.*

Your Windows desktop will now have a "Service Software" group and a "Service Software" icon within that group.

To start the program, double click on the "Service Software" icon .

Using The Windows Interface

If not familiar with the windows type interface, consult the *Microsoft Windows User Guide* for further information.

Common User Interface

Due to the modular design of WinTesla, various generations of Nokia products can be serviced, while sharing a similar user interface. The common user interface is explained in the first part of this document and is followed by the specific module information.

The software can be used to control the phone by entering commands via the keyboard of a PC/AT – running MS Windows 3.1 or 3.11.

NOTE: *Windows 95 and Windows NT are not supported.*
This document refers to WinTesla Version 4.60 or greater.

Equipment Required

- **Computer** : IBM 486 PC/AT or compatible with at least one, unused serial port, COM1 or COM2 one parallel port (LPT1), 5 Meg. hard disk space required.
- **Display** : Any supported by MS Windows version 3.1 or 3.11
- **Operating System** : DOS 5.0 or later running MS Windows 3.1 or 3.11
- **WinTesla Application Software** (product code 0774046)
- **Software Protection Key** PKD–1 (product code – 0750018)

Mechanical Connections

The software controls the phone via a separate adapter (DAU–2) connected to the serial port of the PC and to the phone's bottom connector using the Nokia proprietary communication method called M2BUS.

Attach the protection key PKD–1 (dongle) to parallel port one (25–pin female D–connector) of the PC. When connecting the PKD–1 to the parallel port be sure that you insert the PC end of the PKD–1 to the PC (male side).

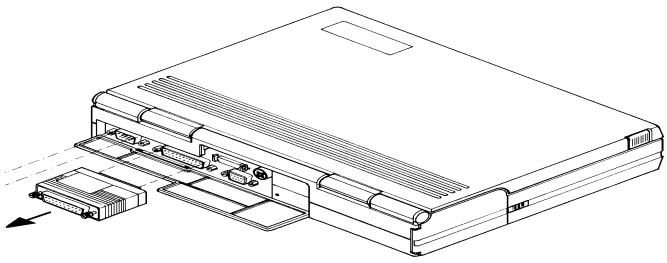


Figure 1. Dongle Insertion

The PKD–1 should not affect devices working with it. If some errors do occur try printing without the PKD–1 connected. If printing is now OK please contact your supplier who will endeavor to replace your PKD–1.

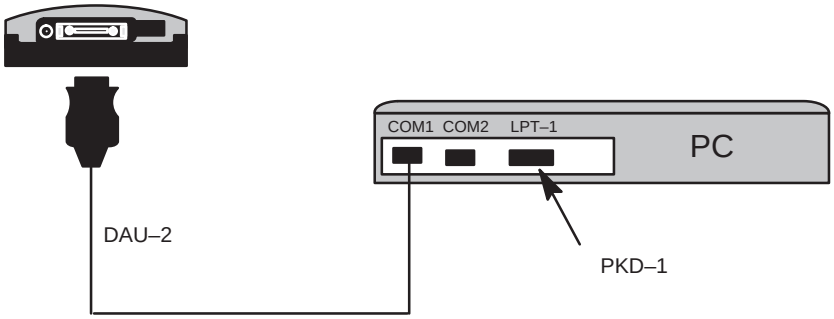


Figure 2. Servicing setup

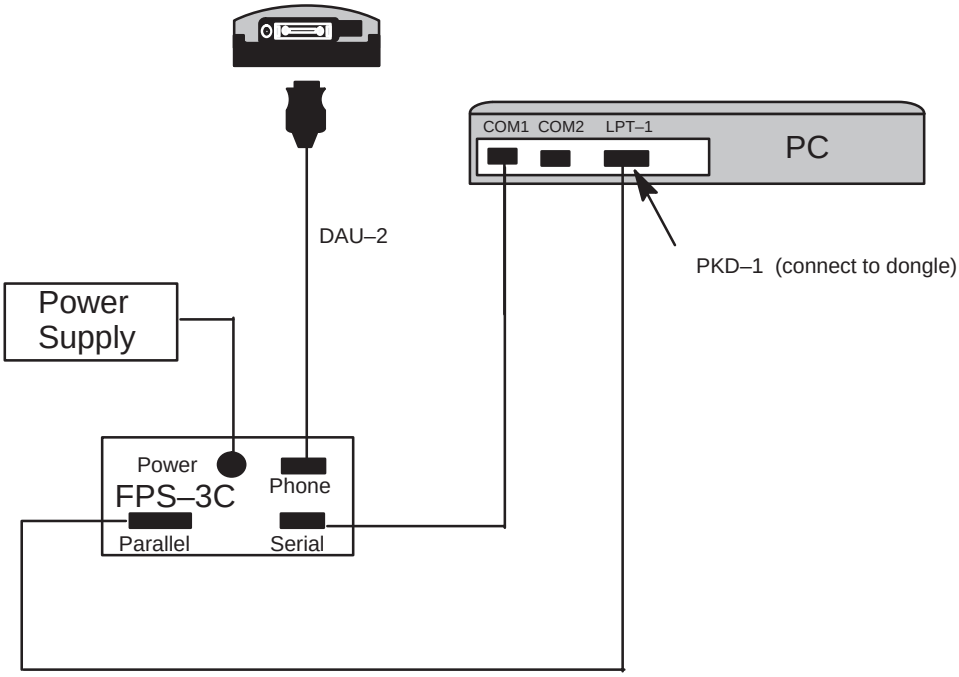


Figure 3. Flash setup

Using Wintesla

Phone Independence

The WinTesla application, “WinTesla.exe”, is phone independent. It relies on separate, phone specific, “modules” to provide communication, menus and test algorithms.

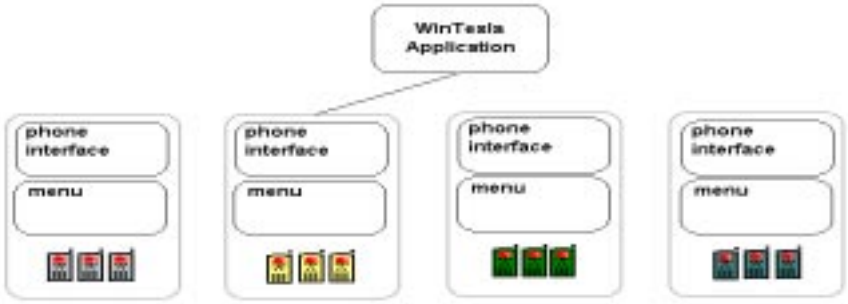


Figure 4. WinTesla with loaded interfaces

For each phone type – or product family – a phone interface module and menu module are required. The modularity of WinTesla allows support for other languages, so one phone type may have one phone interface module and several menu modules, all in different languages.

WinTesla allows you to select the language you wish to use (if available), and will automatically load the correct phone interface module for the connected phone. When a different phone type is connected, WinTesla will load the new phone interface and associated menus.

Login ID Setup

Once the software has been installed you need to set up your own Login ID (max. 3 characters). Start Windows file manager and locate the *validate**op_id.val* (located in the Wintesla subdir) file as shown in Figure 5.

Double clicking on the '*Op_ID.val'* file (a text file) gives a windows error message, in order to avoid this use the **File |Associate** command in file manager and link the file to the Notepad application as shown below.

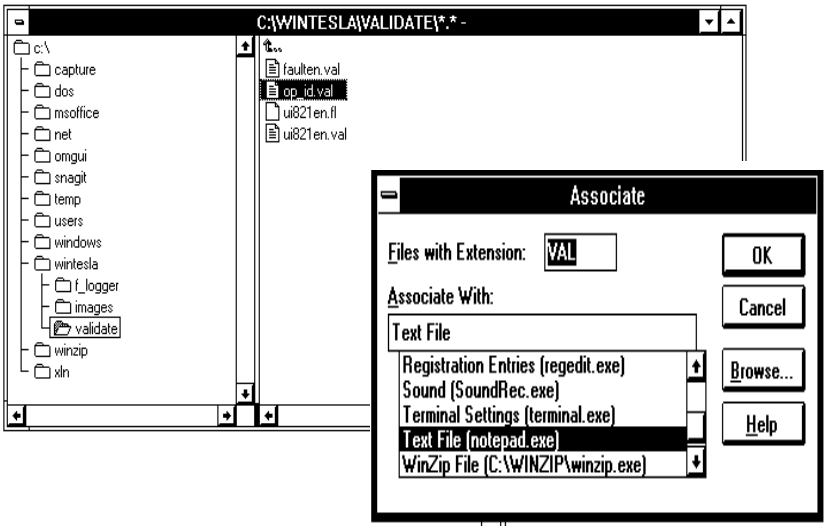


Figure 5. Accessing Op_ID. val file

Now by double clicking on the '*Op_ID.*val', Notepad opens and your own

ID can be entered and saved accordingly. Enter or edit any operator definitions following the existing format in this file.

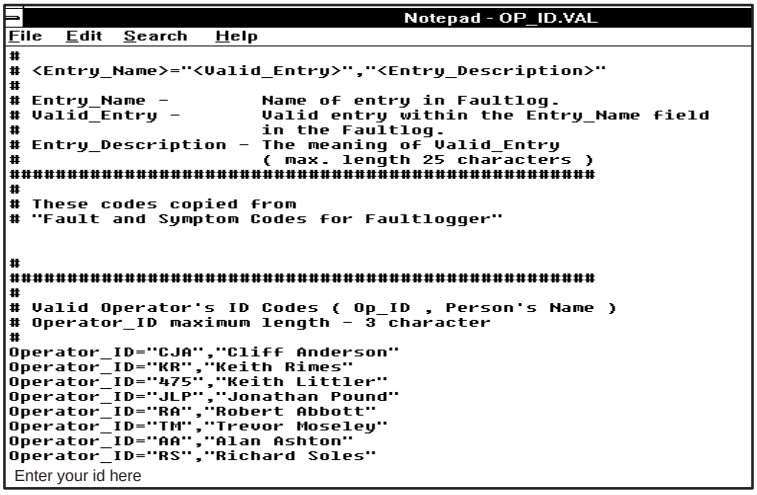

Notepad - OP_ID.VAL
File Edit Search Help
# <Entry_Name>="<Valid_Entry>","<Entry_Description>"
# Entry_Name - Name of entry in Faultlog.
# Valid_Entry - Valid entry within the Entry_Name field
# in the Faultlog.
# Entry_Description - The meaning of Valid_Entry
# (max. length 25 characters)
# These codes copied from
# "Fault and Symptom Codes for Faultlogger"
# Valid Operator's ID Codes (Op_ID , Person's Name)
# Operator_ID maximum length - 3 character
Operator_ID="CJA","Cliff Anderson"
Operator_ID="KR","Keith Rimes"
Operator_ID="475","Keith Littler"
Operator_ID="JLP","Jonathan Pound"
Operator_ID="RA","Robert Abbott"
Operator_ID="TM","Trevor Moseley"
Operator_ID="AA","Alan Ashton"
Operator_ID="RS","Richard Soles"
Enter your id here

Figure 6. Editing Op_ID.val file

The Login Screen

When WinTesla first starts, the Login screen below will appear. Type in your 3 character ID and press `<Enter>` or click on the **"OK"** button.

Figure 7. Login Screen

If WinTesla can not find the file, *op_id.val*, which contains the Login IDs, then the **"OK"** button will be 'greyed'.

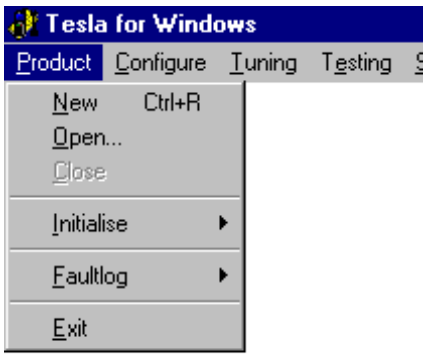
If **"Cancel"** is clicked then the Fault Logging feature of WinTesla will be deactivated.

The WinTesla Screen

The main WinTesla screen – if no phone is attached – is displayed with 3 menu items at the top of the screen and a status bar at the bottom.

The information on the left of the status bar will be used to provide information when WinTesla is performing tasks: such as reading data from the phone. The status bar also includes the name of the current user.

The Product Menu



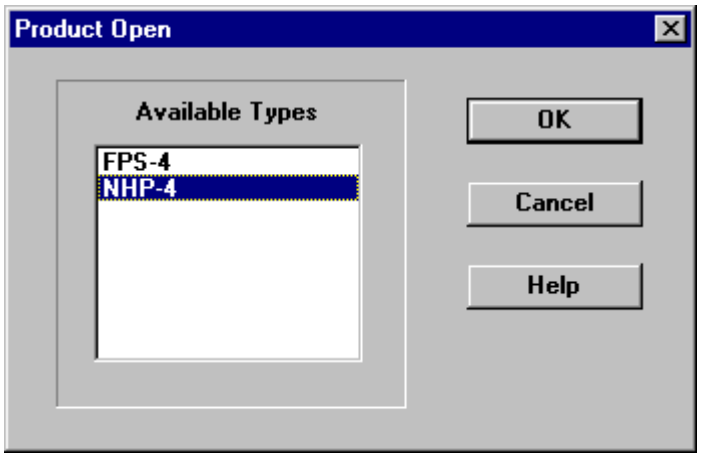
New (Ctrl+R)

The **"New"** function (which can also be activated by pressing <Ctrl+R>) is used to scan for a phone when either the automatic rescan option is off or the automatic rescan timer has not expired (see **Configure|Options** section for automatic rescan).

If the phone type is unrecognized or unsupported by the current WinTesla system then a warning message will be displayed.

Open

The "Open" function allows you to "force load" a phone interface, even if there is no phone connected to the system.



A dialog box will appear and list the supported phone types (see figure above). To select a particular phone type to load; highlight the phone type name and click on **"OK"**.

Clicking on **"Cancel"** will stop the request and no new phone type will be loaded.

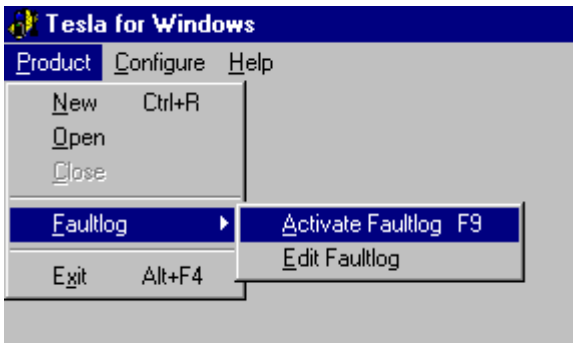
Loading a phone interface will disable the automatic rescan function (see **Configure|Options** section for automatic rescan).

Close

This function will close the currently loaded phone type interface that had been loaded using the **Product|Open** function. You can not close a loaded phone type interface if it was loaded by a rescan.

FaultLog

The FaultLog option has a sub–menu (below). These functions are described in the ”FaultLog Application” section.

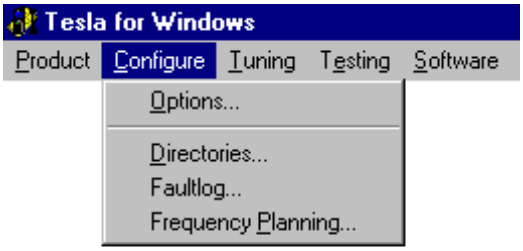


If the FaultLog function has been disabled – either because the Login ID was not correct or disabled through the **Configure|FaultLog** function – then these menus will be ”greyed” and made un–selectable.

Exit (Alt+F4)

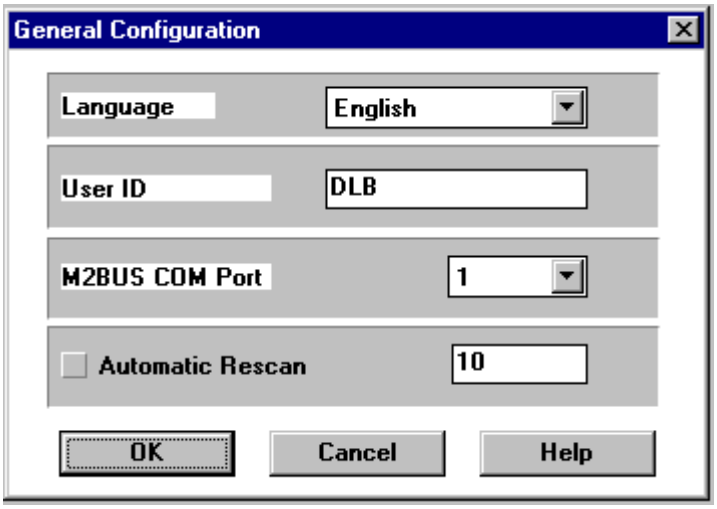
Selecting this option will shut–down the WinTesla program.

The Configure Menu



The configuration menu allows you to setup such things as directory paths, user interface language and FaultLog options.

Options



Language

This option allows you to change the language used in the WinTesla application.

Current Password / New Password / Retype Password

Currently not available

User ID

Allows the user ID to be entered if the users name is setup in the opt_id.val (validation) file.

M2BUS COM Port

This option allows you to select which communications port the phone is to be connected. The change will take place immediately after clicking **"OK"**.

Automatic Rescan

Automatic rescan is a mechanism to automatically check for a new phone; the time between rescans is user configurable. When a phone is scanned and recognized, the corresponding phone interface and menu are loaded, extending the main menu at the top of the screen and displaying the phone type and description at the bottom of the screen.

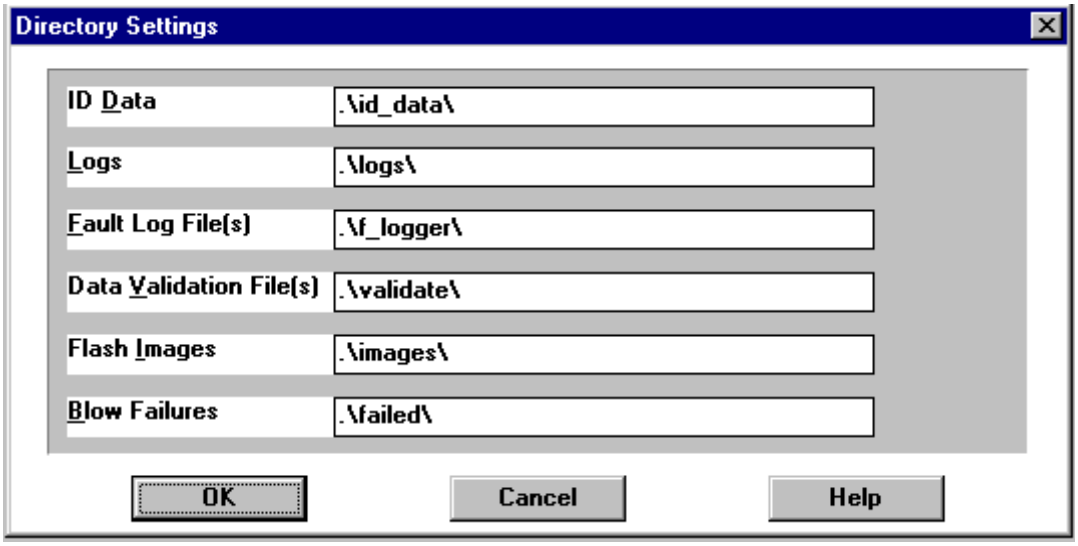
The **Product|New** (or **Ctrl+R**) function can be used to rescan the phone in–between automatic rescans or when automatic rescan has been disabled. The automatic rescan mechanism is disabled when the **Product|Open** function is used to load a phone interface.

A tick in the check–box indicates that the automatic rescan option has been enabled. Clicking on the check–box (making the check–box blank) will disable the automatic rescan option. The time between rescans (in seconds) is entered into the edit box.

Clicking the **"OK"** button will save any changes made. Clicking **"Cancel"** will discard any changes you may have made.

Directories

This function allows you to organize your data into different directories.



The directories must already exist. If an invalid directory is entered then an error message will be displayed (below).

The use of a backslash (”\”) at the end of the directory name is optional.

Clicking on the **”OK”** button will save your changes.

Fault Log Configuration

Fault Log is a feature that allows the PC to create a record of each phone that is serviced for historical tracking. This function allows you to configure the FaultLog mechanism. Clicking **"OK"** after making selections, saves all changes made.

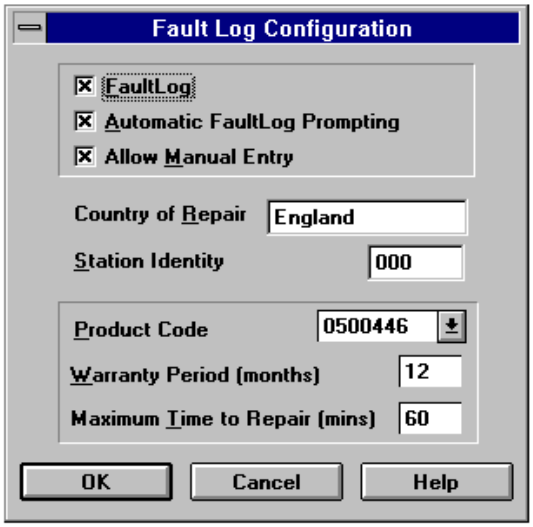


Figure 8. FaultLog – configuration

Fault Log

This option allows you to enable or disable the FaultLog mechanism. Choosing to disable the FaultLog mechanism results in the **Product |FaultLog** options being "greyed" and the F9 button being disabled.

Allow Manual Entry

This option allows you to disable manual entry of data that was unavailable from the phone.

Automatic Fault Log Prompting

Enabling this option results in a prompt being displayed if the phone has changed.

Station Identity

Enter the unique identity of your "workstation"; this ID is used to write FaultLog files.

Country Of Repair

Enter the country of repair.

Warranty Period (months)

Each product code has an associated warranty period. This option allows you to change those warranty periods. If no phone is connected then **all** product codes supported will be displayed. However, if a phone is connected then only the product codes associated with that phone type are displayed.

***Note**: Changing the Warranty Period in the Fault Log data file has no affect on the products warranty terms as stated from the manufacturer.*

Maximum Time To Repair (minutes)

Enter the maximum time allowed to repair a phone.

Fault Log Application.

The aim of the Fault Log application is to provide NMP After Sales Companies worldwide a standard method for the collection of Fault and Repair Data from their service process's. This information can also be used by NMP R&D and Manufacturing organizations as well.

The Fault Log application can be regarded as a data entry sub–routine run from the WinTesla Service Software package at the end of a repair. This allows for quick and uniform recording of the service performed on the product.

Each product repaired, will generate one unique record in a FaultLog file consisting of up to 37 data fields containing information about the product and how it was repaired. This information is read automatically where possible, from the products own internal EEPROM and then entered manually by the Service Technician to form a complete service record.

For more advanced implementations, the repair records are copied and collected by the electronic mail system installed in the Service Center and are sent electronically to a Central Service Database located in Finland.**Completing a FaultLog Record**

Once WinTesla has been configured correctly it operates in the following manner:–

- Wintesla automatically reads the product details from the products EEPROM and writes them as a record to a pre–determined file.
- Proceed with the repair task, utilising a combination of software driven tuning and hardware modifications.
- On completion of the repair task you have a choice:

A.)With the product still connected to the PC, manually display the repair data entry screen by selecting Function Button F9.

B.) Alternatively, the product can be disconnected and the next product for repair connected in its place.

So long as Automatic Prompting is enabled then the previous products repair data entry screen will be displayed.

- Enter the repair work performed on the product in the repair data screen.
- Check the automatic data for this product, read earlier, to ensure its accuracy.
- When satisfied with the data, save the entry. This process adds a complete record containing the product details and the repair details to the FaultLog output file.

The output file can then be manipulated by a number of different systems, as required, as a detailed record of the product fault.

To attempt to record all of this information 37 data fields are defined for each FaultLog record. These can be split as follows:–

- Product definition information fields

Most products have their information stored in EEPROM, WinTesla automatically reads this information from the EEPROM and writes it to the FaultLog record. This part of the record is shown below.

Fields that are ”greyed out” etc. are data that has been automatically retrieved from the phone’s EEPROM. All other fields are entered manually; fields are summarized below.

Operator

Automatic:	Station, Country
Manual :	*Time to repair, Job ID, Operator ID*

Phone

Automatic:	Product code, Production SN, Order No., Hardware ID, Software version, Mfr. SN/ESN/IMEI, Mfr. Date, Issue date
Manual:	*Warranty*

Fault

Automatic: none

Manual *Module, Fault, Symptom, Circuit ref., Part Number*

The current FaultLog application allows for the entering of three priority levels of fault / repair information seen as *Primary, Secondary* and *Tertiary* faults.

The *Module, Fault* and *Symptom* fields have variables selected by the arrows alongside each respective field.

A comprehensive list of faults and symptoms as well as all current modules are already listed within the software. These three fields can be updated by accessing and editing the following files in a similar manner as described on page 8

Field	DOS File
– *Modules*	nhd4en.val–
– *Faults, Symptoms*	faulten.val

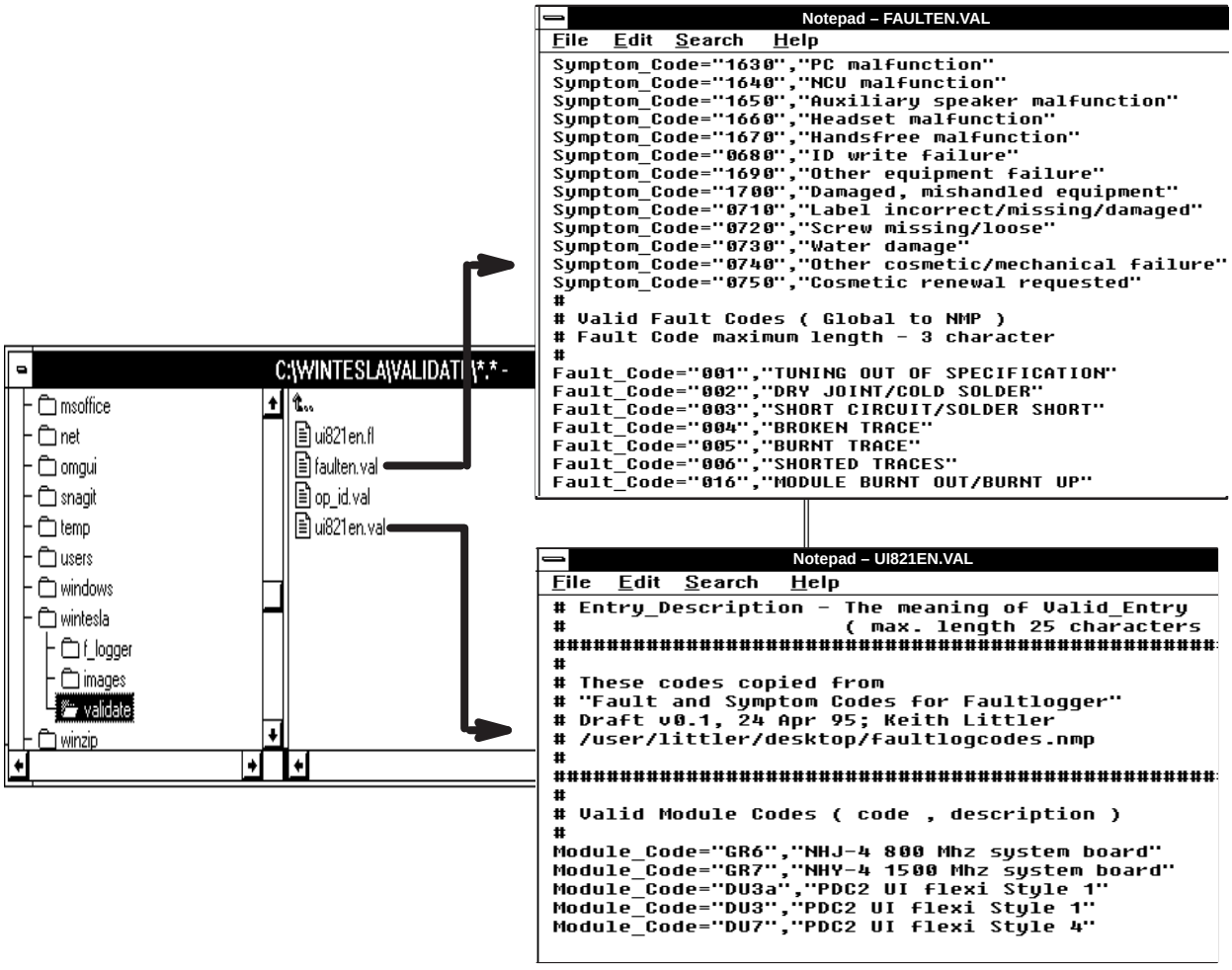


Figure 9. Editing fault, symptoms, modules files

Other Parts Replaced

Automatic	none
Manual	all fields

Enter other parts that have been replaced i.e. for wear and tear purposes etc..

This Entry

Automatic	;	Entry Indicator, Date, Time
Manual	;	*Comment*

Cost

Automatic	;	Total
Manual	;	*Parts, Labour*

This facility is for the use of third party repairers only

FaultLog Macros

The Macro sub–menu can be accessed by selecting the **"Macros"** button on the FaultLog main screen.

Macros in FaultLog are a set of standard repair actions defined and stored in order to represent frequently repeated repairs. These Macro's are related to the Product Code of the product, so whatever product is connected, FaultLog will display the Macro list for that particular Product Code.

A Macro's standard repair information can also be pasted into the FaultLog record for that product.

Macro's are saved initially under a name you can define yourself from the main FaultLog screen. All the information contained in the manually entered fields i.e. Module, Fault, Symptom, Circuit Ref and Part Number is recorded and saved under this name.

Setting up a macro

After completing a manual entry as normal but before saving the record, select the **"Macros"** button. This will bring you into the Macro definition screen.

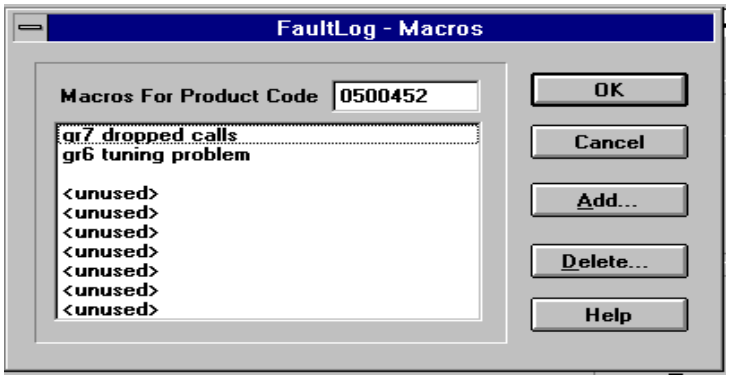


Figure 10. FaultLog – macro setup

Place the cursor over the next available Macro entry then select **"Add"**.

Give the Macro record a meaningful name and click on **"OK"**. You have now saved the repair data into a Macro for future use.

Use the **"Delete"** function to remove unwanted macros.

Now, when a similar problem is seen with another unit you can recall this saved repair information into the units FaultLog record. If needed, the FaultLog record can be edited after being recalled to customize the repair before saving the FaultLog record.

There are a maximum of 10 Macro's definable for each Product Code. If an eleventh is required, it will be necessary to overwrite one of the previous Macro's.

The Macro definition file is called *macro.fl* and will be found in the path specified for the data validation files. If this path is a networked path all operators connected to the network will be permitted to share a common Macro list helping with reporting uniformity.

Help

An extensive help facility is available by clicking any screen or toolbar help button and features convenient hypertext linking for easy navigation.

HD891 Module

Information in this section is specific to the HD891 module and assumes that the setup procedures in the common interface section have been carried out.

Installing the HD891 Service Module

The HD891 Service module software is delivered on a 3.5" diskette and must be run under the Wintesla core software package.

To install the HD891 Service Module software, proceed as follows:

Insert the HD891 Service Module diskette into drive A: of your PC.

From Windows File Manager select the file `a:\install.exe` and click **"OK"**.

Follow the on screen instructions and select the *new* install option when prompted to do so.

***WARNING**: The service module requires the Wintesla core software application to be installed first for this module to function.*

***NOTE**: Be sure to install the Service Module in the same directory as the Wintesla core software application.*

Required Servicing Equipment

The following is a list of equipment that is needed in order to service the HD891 family of products.

- **HD891 Software Service Module** (product code: 0774062)
- **Dongle ‘blackbox’ adapter DBA–**1 (product code: 0630044)
- **M2BUS adapte**r **DAU–2** (product code: 0750006)
- **RS–232 adapter,** 9–to–25 pins (product code: 4626170)
- **RS–232 cable** (product code: 0730090)
- **Centronics cable** (product code: 0730029)
- **Service cable SCS –1** (product code: 0770010)
- **Service cable SCS–10** (product code: 0775059)
- **Audio cable ADS–1** (product code: 0730011)
- **Modular cable XCM–1** (product code: 4626131)
- **Flash Programmer Set FPS–3C** (product code: 0770110)
- **Power connector PCS–1** (product code: 0730012)
- **Modular T Connector** cable (product code: 4626134)
- **Dummy Battery BTS–4** (product code: 0770009)
- **Covers off Jig JBS–16** (product code: 0775039)
- **Service box JBS–7** (product code: 0770015)

Equipment Setup

***Caution**: Make sure that you have switched off the PC and the printer before making connections !*

***Caution**: Do not connect the PKD–1 key to the serial port. You may damage your PKD–1 !*

Attach the protection key PKD–1 to parallel port one (25–pin female D–connector) of the PC. When connecting the PKD–1 to the parallel port be sure that you insert the PC end of the PKD–1 to the PC (male side). If you use a printer on parallel port one, place the PKD–1 between the PC and your printer cable.

Next connect the M2BUS adapter to the serial port (RS–232) of the computer. In case you are using a 9–pin serial port (normal with an AT set) use the mating adapter supplied with the M2BUS adapter.

Attach one end of the XCM–1 modular cable to the DAU–2 PC/M2BUS adapter and the other end to the JBS–7 service box. Use suitable adapter, SCS–1 service cable when the covers of the phone are in place, JBS–8 test frame with the phone covers off, and attach it to the phone. Then connect it to the service box.

Dealer Setups

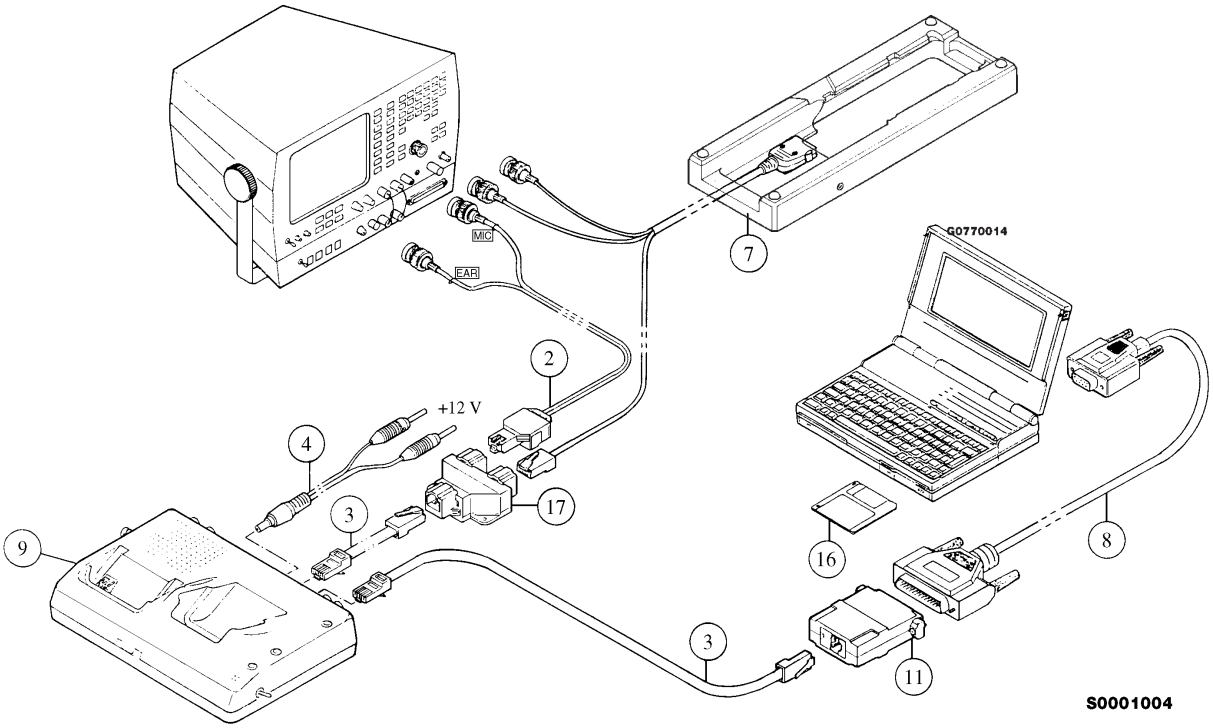


Figure 11. Testing/Tuning with covers off

Item	Description	Product Code
2	ADS–1	0730011
3	XCM–1	4626170
4	PCS–1	0730012
7	JBS–16	0775039
8	RS232 Adapter	4626170
9	JBS–7	0770015
11	DAU–2	0750006
16	Software diskette	0774062
17	Modular T connector	4626134

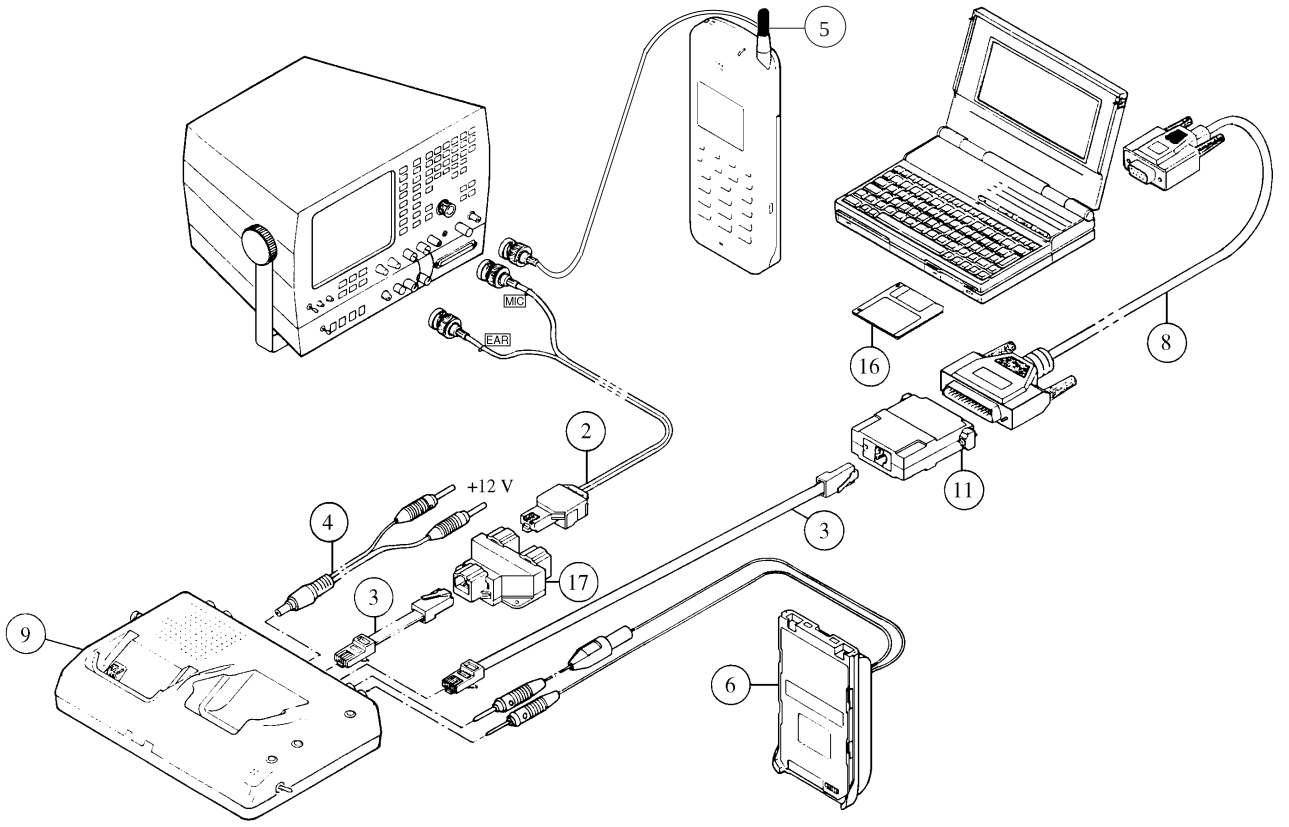


Figure 12. Testing/Tuning with covers on

Item	Description	Product Code
2	ADS–1	0730011
3	XCM–1	4626170
4	PCS–1	0730012
5	TDA–1	0750086
6	BTS–4	0770009
8	RS232 Adapter	4626170
9	JBS–7	0770015
11	DAU–2	0750006
16	Software Diskette	0774062
17	Modular T connector	4626134

Main Menu

The main menu bar below appears when HD891 initializes, adding the following new categories, *Tuning,Testing, Software, Dealer* and *Help. Product* and *Configure* have also changed.

Product

The following items are added to this menu when HD891 is recognized:

Initialise

Allows the phone to be set up in either *Normal*, *Local or Minimum* mode.

Normal Mode

When selecting *Norma*l mode, the phone tries to synchronize to the base station and a displays this message. This is ”normal” operation mode of the phone.

Minimum Mode

When *Minimum* mode is selected, the phone is deactivated and only the MCU will communicate with the PC using the Service Software. This mode is used for Flash software changes.

Local Mode

When *Local* mode is selected, the phone is suspended from normal operation and set to a special mode allowing Tuning and Testing to be done.

Configure

Frequency Planning

This configures the channel number, for a product type, to be *Low, Mid, High* in order to allow losses to be configured for manual testing.

Tuning Steps of Radio Unit

The Service software program places the phone in the Local mode, during which the phone can be externally controlled via the M2BUS interface.

The tuning values of the phone reside in the EEPROM. Before tuning these values are read by the Service software and the user can change these values with tuning functions.

During tuning, keep the following in mind:

– Take care not to damage sensitive measuring instruments with excessive RF power.

– Carry out all tuning steps in the shortest possible time to avoid excessive heating of RF units.

– Perform all tuning steps in the order presented.

– Limit the power supply to a maximum current of 1.3 amps to prevent excessive damage to the phone in the event of shorted components.

– Never try to mask a fault by ”tuning it out.”

Accuracy of the Equipment During Measurement

– Power supply 1; nominal voltage 12 ±0.5 V current cap. min. 1.5 A for service box (JBS–7).

– Power supply 2 ;nominal voltage 6.0 ±0.1 V, current cap. min. 1.5 A.

– Modulation analyzer power level resolution 0.1 dB, accuracy ±0.5 dB. Frequency counter accuracy 0.1 ppm ⟨±80 Hz).

– RF generator; frequency res. 10 Hz amplitude res. 0.1 dB frequency stab. ±0.25 ppm.

– Spectrum analyzer; dynamic range 70 dB, accuracy ±1 dB (For power level measurement accuracy ±0.5 dB).

Baseband Alignment and Flash Station Tests

Flash Programming

This procedure programs the phone software into the flash memory.

Flash Programming procedure:

– Connect the phone to the FPS–3C Flash Programming Box.

– Select **”Software –> Flash”**.

– Select the flash file for the desired software version.

– Click **”OK”**.

– Check the following boxes: **”Set the Phone to Minimum Mode”** and **”Initialize EEPROM after Flash”**.

– If the phone had been successfully aligned before and the RF tuning parameters are to be retained, check the **"Keep RF Parameters"** box.
– If the user data (i.e., phone number, service settings, etc.) are to be retained, check the **"Keep User Data"** box.
– If the selected software had been previously downloaded to the flash box, click the **"Skip Download to Flash Box"** box. This feature is particularly useful when doing multiple flash downloads with the same software.
– Click on **"OK"** to download the new software.

Flash Download Verification procedure:

– From the main menu of the Service Software, select **"View –> Phone Identity"**.
– If the window that pops up displays the software version that had been selected for download, then the phone was successfully flashed.

Factory Value Set

This procedure initializes the EEPROM with default values.

Factory Value Set procedure:

– Using the JBS–7 service jig, replace the standard battery of the phone with the dummy battery BTS–4.
– Apply +6.0 V to dummy battery.
– Select **"Software –> Initialize EEPROM"**.
– Select the phone type that the phone is to be set as, i.e., Sprint or Nokia.
– Click on the box(es) for the EEPROM parameters that are to be initialized.
– Note that there is a **"View RF Param"** button. This feature enables the user to view the RF tuning parameters stored in the EEPROM. The user may wish to use this feature to verify that the stored RF parameters are no longer needed as initializing the EEPROM will erase all previous values.
– Click **"OK"** to initialize the EEPROM.

Battery Voltage Tuning

This procedure reads the analog–to–digital conversion value of the BATT_ADC voltage when set to +6.0 V for a reference parameter. The readings are performed ten times and an average result is calculated which is then stored into the EEPROM.

Battery Voltage Tuning procedure:

– Using the JBS–7 service jig, replace the standard battery of the phone with the dummy battery BTS–4.

– Apply +6.0 V to dummy battery.
– Select **"Tuning -> Battery Voltage"**.
– Store the new values to the phone by clicking on **"Tune"**.

Charger Voltage Tuning

Similar to Battery Voltage Tuning, this procedure reads the analog–to–digital conversion value of the CHAR_ADC voltage when set to +6.0 V for a reference parameter. The readings are performed ten times and an average result is calculated which is then stored into the EEPROM.

Charger Voltage Tuning procedure:

– Using the JBS–7 service jig, replace the standard battery of the phone with the dummy battery BTS–4.
– Apply +6.0 V to dummy battery.
– Select **"Tuning -> Battery Voltage"**.
– Store the new values to the phone by clicking on **"Tune"**.

RF Temperature Tuning

This procedure reads the analog–to–digital conversion value of the ambient temperature and stores it as two values, RFTEMP1 and RFTEMP2, as a temperature reference for the phone. This adjustment should be made with the phone at room temperature, +25C. It is important that all RF transmitter tunings be done as quickly as possible. This is to ensure that this reference temperature adjustment is within limits required for temperature compensation.

RF Temperature tuning:

– Using the JBS–7 service jig, replace the standard battery of the phone with the dummy battery BTS–4.
– Apply +6.0 V to dummy battery.
– Select **"Tuning -> RF Temp"**.
– The Program reads the ADC values of the ambient temperature for the EEPROM parameters, RFTEMP1 and RFTEMP2.
– Store the new values to the phone by clicking on **"Tune"**.

RF Tuning and Testing

***WARNING**: The phone can not be Tuned properly if connected to the FPS–3C Flash Programming Box. Please use only one of the setup configurations listed in the "Dealer Setups" section of the NHD–4NX Service Manual.*

CDMA Bias Quiescent Current Test

***CAUTION:** During procedures that require the phone to transmit high power, ensure that the power supply limits the current to a maximim of 1.3 amps. This is to prevent further damage to the phone in the event there are any shorted components within the transmit circuitry.*

This test checks if there is excessive current drain while transmitting. This procedure reads the current consumption of the phone while transmitting with minimum gain.

CDMA Bias Quiescent Current test procedure:

– Using the JBS–7 service jig, replace the standard battery of the phone with the dummy battery BTS–4.
– Apply +6.0 V to dummy battery.
– Connect a spectrum analyzer to the antenna connector.
– Select **"Testing –> CDMA Tests"**.
– Check the **"Troubleshooting Mode On"** box and allow the phone to enter Suspend CDMA mode.
– Check the **"Rho On"** box to turn on the transmitter.
– Select **"CDMA TX Gain Control"**.
– A warning message window will appear reminding the user to limit the power supply to 1.3 amps. Click **"OK"** to continue.
– A TX Gain Control slider with a range from 0 to 1023 will appear. The slider represents the TX IF AGC DAC value with the value of 0 being maximum gain and 1023 being minimum gain. Set the TX Gain Control to minimum gain.
– Check that the phone current is within specified limits.
– Click on **"Close"** when done.

AFC Tuning

This procedure tunes the VCTCXO frequency to 15.36 MHz. An unmodulated transmitter carrier on channel 650 is used to perform this test. The VCTCXO is tuned by adjusting the AFC PDM until the carrier is on frequency at 1882.50 MHz within +/–100 Hz and then storing the PDM value into the EEPROM.

AFC Tuning procedure:

– Using the JBS–7 service jig, replace the standard battery of the phone with the dummy battery BTS–4.
– Apply +6.0 V to dummy battery.
– Connect a spectrum analyzer to the antenna connector.

– Select **"Tuning –> AFC"**.
– Follow the set–up instructions displayed and click on **"Continue"**.
– Adjust the carrier frequency to 1882.50 MHz +/– 100 Hz with the **PgUp/PgDn** keys for coase adjustments and the **Up/Dn** arrow keys for fine adjustments.
– Click on **"Save & Exit"** to store the PDM value to the EEPROM.

RX AGC Tuning and Dynamic Range Check

This procedure aligns the RX AGC circuitry. The RX AGC is aligned by injecting a carrier signal at an offset of 540 kHz from the assigned channel frequency (i.e., Ch 650 = 1962.5 MHz, injected signal = 1963.04 MHz.) The gain of the RX AGC circuitry (IF AGC IC, N9) is then adjusted to obtain a fixed output level for the receiver I and Q output signals. The amount of adjustment to obtain this fixed level corresponds to the RX CTR value. By using the RX CTR value, an AGC tuning value is then derived. The entire procedure is performed ten times corresponding to ten different power levels of the injected carrier signal, ranging from –105 dBm to –25 dBm.

RX AGC Tuning and Dynamic Range Check procedure:

– Using the JBS–7 service jig, replace the standard battery of the phone with the dummy battery BTS–4.
– Apply +6.0 V to dummy battery.
– Connect a signal generator to the antenna connector.
– Select **"Tuning –> RX AGC/Dynamic Range"**.
– Follow the set–up instructions displayed.
– Click on **"Next"** to read the AGC tuning value for the first RX signal level.
– Repeat the procedures and continue until all ten power levels have been measured.
– Click on **"Save & Exit"** to store the AGC tuning values to the EEPROM.

TX Gain Check

CAUTION: *During procedures that require the phone to transmit high power, ensure that the power supply limits the current to a maximim of 1.3 amps. This is to prevent further damage to the phone in the event there are any shorted components within the transmit circuitry.*

This test checks the dynamic range of the TX attenuator to ensure that there is enough gain in the TX chain. During normal operation the TX RF ATT (N300) control signal is fixed and not adjusted. However, during this procedure the phone will transmit with maximum gain from the TX IF AGC IC (N308) and with maximum attenuation from the TX RF ATT (N300) at channel 1175 to duplicate a worst case scenario for TX power output.

TX Gain Check procedure:

– Using the JBS–7 service jig, replace the standard battery of the phone with the dummy battery BTS–4.
– Apply +6.0 V to dummy battery.
– Connect a spectrum analyzer, power meter, or CDMA Test Box to the antenna connector.
– Select **”Tuning** –> **TX Gain Check”**.
– Follow the set–up instructions displayed.
– Enter the measured power into the TX Power window.
– Click on **”Exit”**.

TX IF AGC Tuning and Dynamic Range Check

CAUTION: *During procedures that require the phone to transmit high power, ensure that the power supply limits the current to a maximim of 1.3 amps. This is to prevent further damage to the phone in the event there are any shorted components within the transmit circuitry.*

Since the gain of the TX PA (N304) and the amount of attenuation at TX RF ATT (N300) are fixed, only the TX AGC circuitry needs to be calibrated. For every TX CTR value used, a certain amount of TX gain is expected form the TX AGC circuitry. This procedure transmits the phone according to a predetermined TX CTR value and compares the measured result to a typical expected value. The difference is then used to calculate the tuning value. The procedure is done seventeen times for different TX CTR values that correspond to a transmit range of from approximately –69 dBm to +28 dBm to ensure linearity across the dynamic range of the TX AGC circuitry.

TX AGC Tuning and Dynamic Range Check procedure:

– Using the JBS–7 service jig, replace the standard battery of the phone with the dummy battery BTS–4.
– Apply +6.0 V to dummy battery.
– Connect a spectrum analyzer, power meter, or CDMA Test Box to the antenna connector.

– Select **"Tuning** –> **TX IF AGC Tuning/Dynamic Range Check"**.
– A warning message window will appear reminding the user to limit the power supply to 1.3 amps. Click **"OK"** to continue.
– Follow the set–up instructions displayed.
– Measure the transmit power for the first TX Counter value and enter it in the corresponding window.
– Click on **"Next"** to continue to the next TX Counter value.
– Repeat the measurement steps and continue until the transmit power for all TX Counter values have been measured and entered.
– Click on **"Save & Exit"** to store the tuning values to the EEPROM.

TX Limiting, TX Emissions, and Frequency Compensation

CAUTION: *During procedures that require the phone to transmit power, ensure that the power supply limits the current to a maximim of 1.3 amps. This is to prevent further damage to the phone in the event there are any shorted components within the transmit circuitry.*

This procedure sets the limit for maximum TX output power. The TX limit is set to ensure that the phone does not transmit excessive power which may interfere with the CDMA network. Also, the TX limit ensures that the phone meets SAR requirements and prevents excessive current consumption thereby prolonging battery life. During this procedure the TX limiting PDM (TXI REFC) is adjusted while the phone is transmitting to obtain an output level of approximately 22.8 dBm. The current is also measured to check that it is within specified limits.

After the TX limiting PDM value is determined, a TX emissions test is done by measuring the difference (dBc) between the carrier and the ACP (adjacent channel power), +/–1.265 MHz offset from the carrier.

Finally, the phone transmits on five other channels using the TX limiting value just obtained. At each channel the output power is measured and an algorithm determines the frequency compensation PDM values for a flat frequency response across the TX bandwidth for TX limiting.

TX Limiting, TX Emissions, and Frequency Compensation procedure:

– Using the JBS–7 service jig, replace the standard battery of the phone with the dummy battery BTS–4.
– Apply +6.0 V to dummy battery.
– Connect a spectrum analyzer and/or a CDMA Test Box (with a built–in spectrum analyzer if used alone) to the antenna connector.
– Select **"Tuning** –> **TX Limiting Level"**.
– Follow the set–up instructions displayed.
– Adjust the TX limit until approximately 22.8 dBm is obtained by using the **PgUp/PgDn** keys for coarse adjustments and the **Up/Dn** arrow keys for fine adjustments.
– Enter the measured TX power in the TX Output window.
– Enter the measured current consumption in the Phone current window.

– Click on **"Next"** and follow the set–up instructions for TX Emissions measurement.
– Measure the dBc of the ACP. Enter the absolute value of the dBc in the TX Emissions window (i.e., enter 32 if the measure value was –32dBc).
– Then enter the measured TX power in the window corresponding to the first channel (1851.25 MHZ).
– Click on **"Next"** and enter the measured transmit power for the next frequency.
– Repeat the above step and continue until all other frequencies have been measured.
– Click on **"Save & Exit"** to store the TX limiting PDM and frequency compensation values into the EEPROM.

Open–Loop AGC Alignment

This procedure ensures that the phone satisfies the CDMA system requirement for open loop gain. The requirement is such that the power level of the forward link plus the reverse link power must equal to –76 dBm. In other words, RX power + TX power = –76 dBm.

For example: If RX signal level = –90 dBm

Then TX signal level = +14 dBm

–90 dBm + 14 dBm = –76 dBm

A parameter called CLoopRef is used to offset the received signal so that the TX output power level meets the open loop gain requirement. During this procedure a RX signal at – 65 dBm is injected into phone and the phone's transmitted power is measured to determine the CLoopRef value. This process is performed over seven different channels to ensure a flat frequency response.

CLoopRef Alignment procedure:

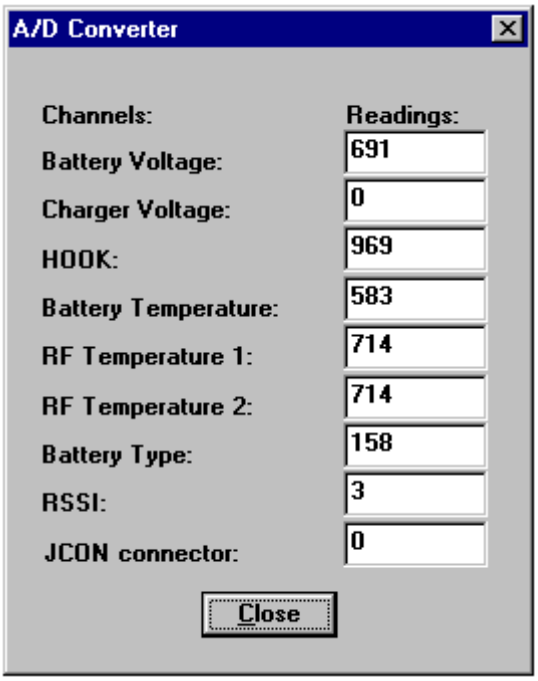
– Using the JBS–7 service jig, replace the standard battery of the phone with the dummy battery BTS–4.
– Apply +6.0 V to dummy battery.
– Connect a signal generator and a spectrum analyzer/power meter or a CDMA Test Box to the antenna connector.
– Select **"Tuning** –> **Open–Loop AGC"**.
– Follow the set–up instructions displayed.
– Measure the TX power for the first channel and enter it in the TX power window.
– Click on **"Next"** to measure the next channel.
– Repeat the measurement step above and continue until all channels have been measured.
– Click on **"Save & Exit"** to store the CLoopRef value to the EEPROM.

Testing

Self Tests

This option runs the phone's self test sequences and reports any processor visible faults. The self tests provide an effective initial test for a faulty phone.

ADC Readings

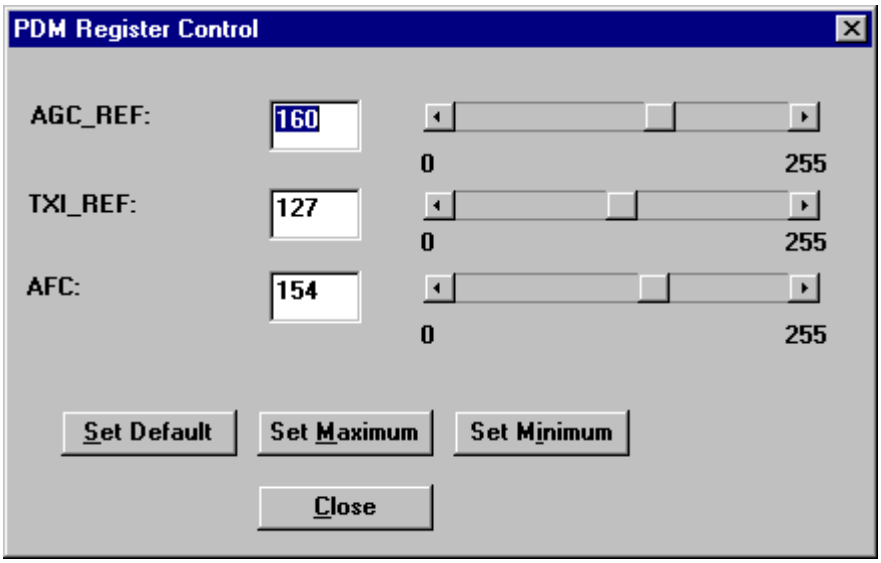


This option allows the phone's ADC readings to be displayed. The readings are updated every few seconds. There may be some delay before the mouse or keyboard responds while running this test.

Pulse Division Modulator (PDM) Control

This test screen is to allow control of each PDM separately. The tests in this section will use the PDM controls from this screen during their execution.

PDM Register Control

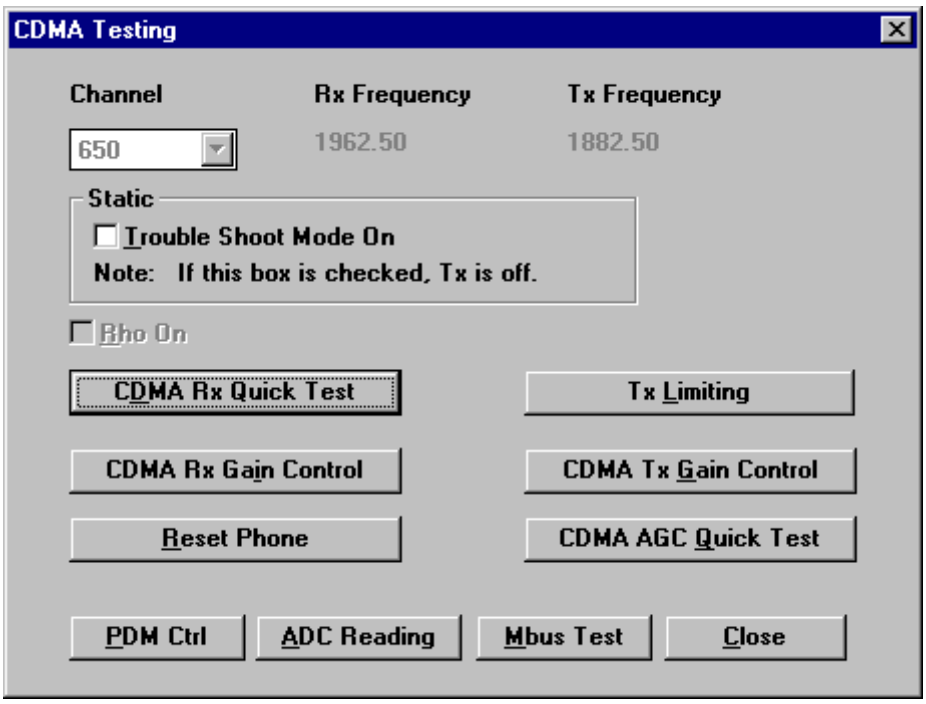


KEYS:

- **<Set Default>** – Sets all PDMs to there default values.
- **<Set Maximum>** – Sets all PDMs to there Maximum values.
- **<Set Minimum>** – Sets all PDMs to there Minimum values.

CDMA Testing

This screen is used when testing and troubleshooting the phone in CDMA mode. Below is an example screen.



Keys:

PDM Ctrl – Opens the PDM Control Screen.

ADC Reading – Opens the ADC reading screen.

Quick RX Test – Opens the Quick Receiver test screen.

Mbus Test – Tests the communication between the phone and the computer.

Close – Exits the current screen.

RHO on:

RHO on – turns the CDMA transmitter on/off.

Troubleshooting mode on:

Troubleshooting Mode on – will set the phone into CDMA mode for technical troubleshooting. This mode is the Local mode for CDMA.

CDMA RX Quick Test

This function provides a simple, yet effective method of verifying the receiver operation. This test sets the phone to channel 650. The user is then directed to input an RX signal at –65 dBm into the phone and measure the RX counter value. The test then guides the user to vary the RX input signal to –85 dBm and –105 dBm and measure the respective RX counter values. By observing the difference in measured RX counter values vs the input signals, the functionality of the receiver can be observed.

CDMA RX Gain Control

This function enables the user to manually control the amount of gain in the receiver. Upon selecting this function, the user is presented with a slider control with a range from 0 to 1023. The value of the slider represents the RX DAC value used to control the gain of the RX IF AGC IC (N9) with the value of 0 being maximum gain and 1023 being minimum gain.

Reset Phone

This function simply resets the phone to normal operating mode.

TX Limiting

This function allows the user to manually control the TX limiting PDM (TXI REFC) resulting in changing the set point of the TX limit for the phone. By controlling the PDM, the user can test the TX IImiting operation and the related TX circuitry. This function also enables the user to test the frequency compensation performance of the phone by presenting a frequency sweep from channel 25 to 1175 at the TX limit. The user selects the step gain of the frequency sweep, i.e., step up every 50 channels, and the amount of time (in miliseconds) the phone will transmit at each channel.

CDMA TX Gain Control

This function enables the user to manually control the amount of gain in the transmitter. Upon selecting this function, the user is presented with a slider control with a range from 0 to 1023. The value of the slider represents the TX DAC value used to control the gain of the TX IF AGC IC (N308) with the value of 0 being maximum gain and 1023 being minimum gain.

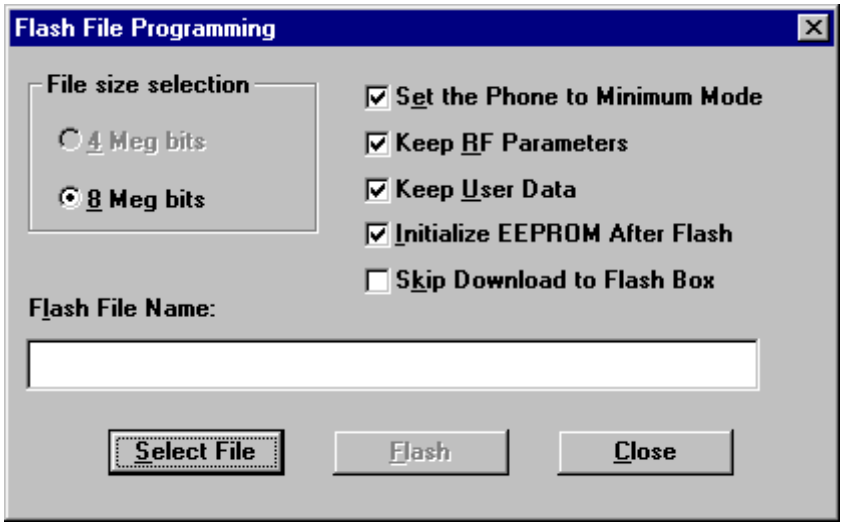
CDMA AGC Quick Test

This function allows the user to test both the RX and TX AGC performance of the phone. The test sets the phone to channel 650 and the phone transmits it output power in accordance with the receive signal strength. The user is first directed to input an RX signal at –65 dBm where the test records the RX and TX counter values for that signal level. The user is then directed to change the RX siganl level to –85 dBm which should change the RX and TX counter values accordanly. By measuring the difference between the counter values for each receive signal level, the user can quickly determine if the AGC circuitries are functional.

Software Menu

The Software menu provides the following options:

Flashing



This option allows you Reflash a phone with a new version of flash software, enabling new features to be added and bugs to be removed.

This Reflash option relies on the phone being in full working order and containing the correct HWID and Product Code.

NOTE: *To successfully update the flash code, the Nokia FPS–3C **MUST** be connected to the PC that is running the WinTesla software. (see mechanical connections in the service manual for details)*

WARNING: *The computer that is connected to the FPS–3C Flash box **MUST** have it's parallel port configuration set to **standard AT type**. Otherwise downloading the flash image to the "black box" will fail.*

Reflashing summary:

– Ensure the computers parallel port is configured properly.
– Select **"Software –> Flash"**.
– Select the correct flash file to be flashed to the phone.
– Set Flash options in dialog box.
– Click on the **"Flash"** button.

Dialog Options

Each of the options available are described below. It is suggested that only experienced operators change these settings from there default values.

File size selection

Changes the size parameters for the flash file. Default value is 8 Meg bits.

Check box – set phone to minimum mode

Automatically sets the phone to minimum mode. If not set, the operator must "force" the phone to this mode using hardware.

Check box – Keep RF parameters

This option will save the RF parameters before flashing the phone. Once flash updating is complete, these parameters will be stored back to the phone.

Check box – Keep User Data

This option will save user data before flashing the phone. Once flash updating is complete, the user data will be saved back into the phone.

USER DATA SAVED:

- Short Code Memory
- NAM programming information
- Calling Card Numbers
- SID Lists
- System Feature codes
- UI Settings
- Warranty Information

Check box – Initialize EEPROM after Flash

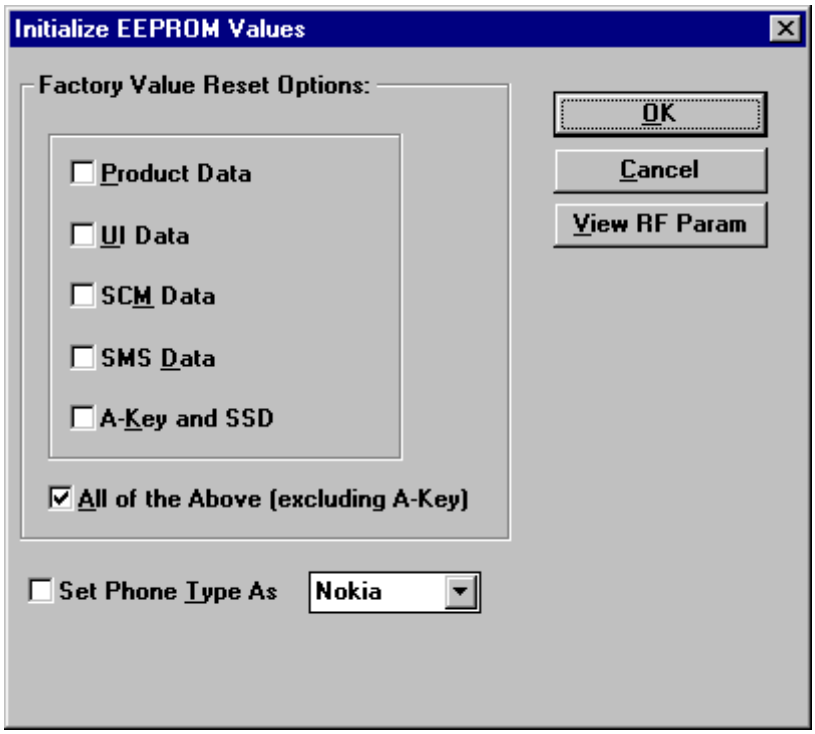
This option will prompt for initialization of the EEPROM after flash updating is complete. It is recommended that the EEPROM be "Initialized" after flash updating the phone. (*see Initialize EEPROM for more details on this function*)

Check box – Skip download to Flash box

The flash update is done using a two step process. the flash image is downloaded to the flash box in the first step. This takes about 30 to 45 seconds. Then the image is updated on the phone during the second step.

This option is useful if you are updating several phones with the same flash image. After completing the first phone update, checking this option will skip the first step of downloading the flash image to the box again. It is not necessary to download the image again because the box will contain the last image loaded unless a loss of power occurs.

Initialize EEPROM



This option will re–initialize the phone's EEPROM settings.

CAUTION: *All the phone's calibrated (tuned) data will be erased by this option and the phone MUST now be recalibrated.*

Product Data

This option will reset the Product data.

UI Data

This option will reset the user interface data.

SCM Data

This option will reset the short code memory data.

SMS Data

This option will reset the short messaging services data.

All of the above

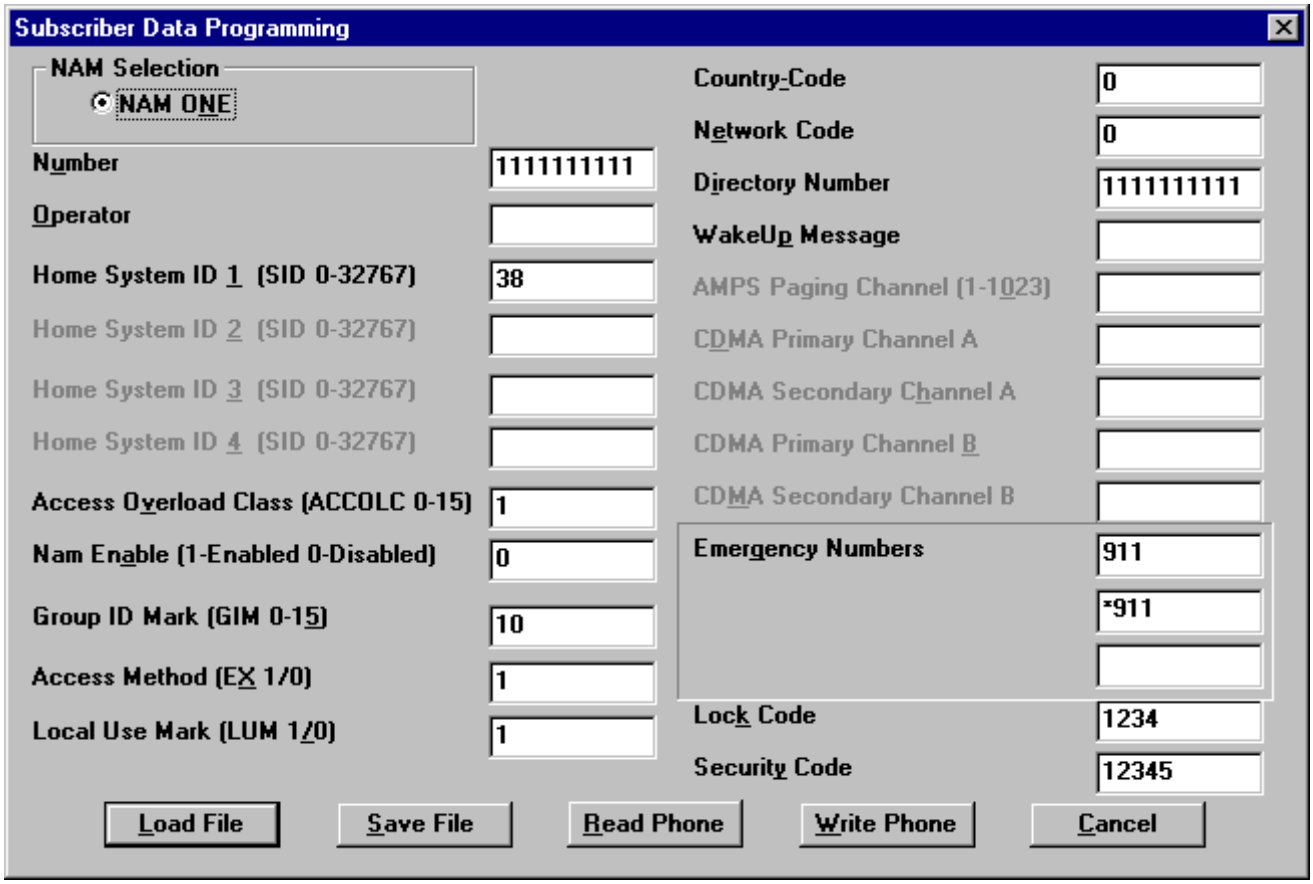
This option will reset all of the above.

View RF Parameters

Opens the RF parameters dialog for viewing this data.

Dealer Menu

NAM Programming



This option allows you to program the NAM information, wake up message, Emergency numbers, Lock code and security code of the phone.

Keys:

NAM Selection
Selects NAM contents to be displayed.

Load File
Prompts user to select a file containing NAM information.

Save File
Allows user to save screen contents to a file.

Read Phone
Reads phone contents to screen.

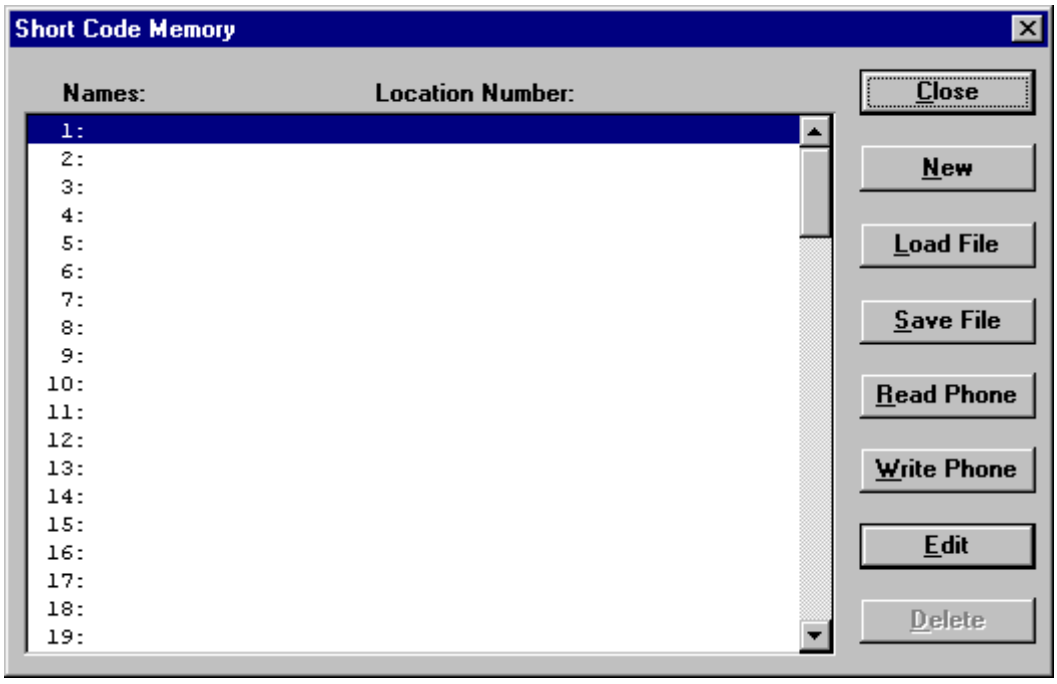
Write Phone
Writes contents of screen to phone.

Default NAM Parameter Settings

These settings apply to both NAM 1 and NAM 2 unless stated otherwise. Values are shown in decimal format.

Parameter	Default Setting	Valid Values
Own Number (Phone No. associated with NAM, more specifically known as the MIN)	000 000 XXXX (where XXXX is the last 4 digits of ESN)	10 digits;
Home SID List		1 – 32767 for each SID. Up to 4 unique SIDs
Access Overload Class	last number of MIN	0 – 15
NAM Status		Enabled/Disabled
Group ID	10	0 – 15
Access Method	1	0,1
Local Use Mark	1	0,1
Country Code	0	0 – 999
Network Code	0	0 – 99
Directory Number (Phone No. associated with NAM, more specifically known as the MDN)	000 000 XXXX (where XXXX is the last 4 digits of ESN)	10 digits;
Emergency Numbers	911, *911, empty.	
Lock Code	1234	
Security Code	12345	

Short Code Memory (SCM)



This option allows the user to change the phone directory numbers (also known as short code memory).

Keys:

Close

Closes Short Code memory screen.

Load File

Prompts user to select a file containing Short Code Memory information.

Save File

Allows user to save screen contents to a file.

Read Phone

Reads phone contents to screen.

Write Phone

Writes contents of screen to phone.

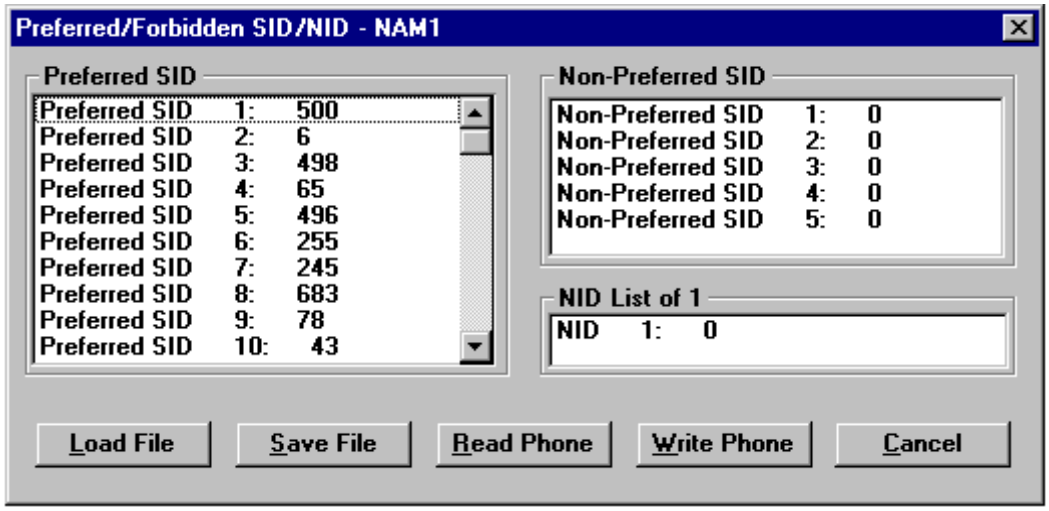
Edit

Edits the highlighted entry.

Delete

Deletes the highlighted entry.

SID Programming



This option allows you to edit the SID list. Highlight an entry using the <TAB> key and press enter to edit.

Keys:

Load File

Prompts user to select a file containing SID information.

Save File

Allows user to save screen contents to a file.

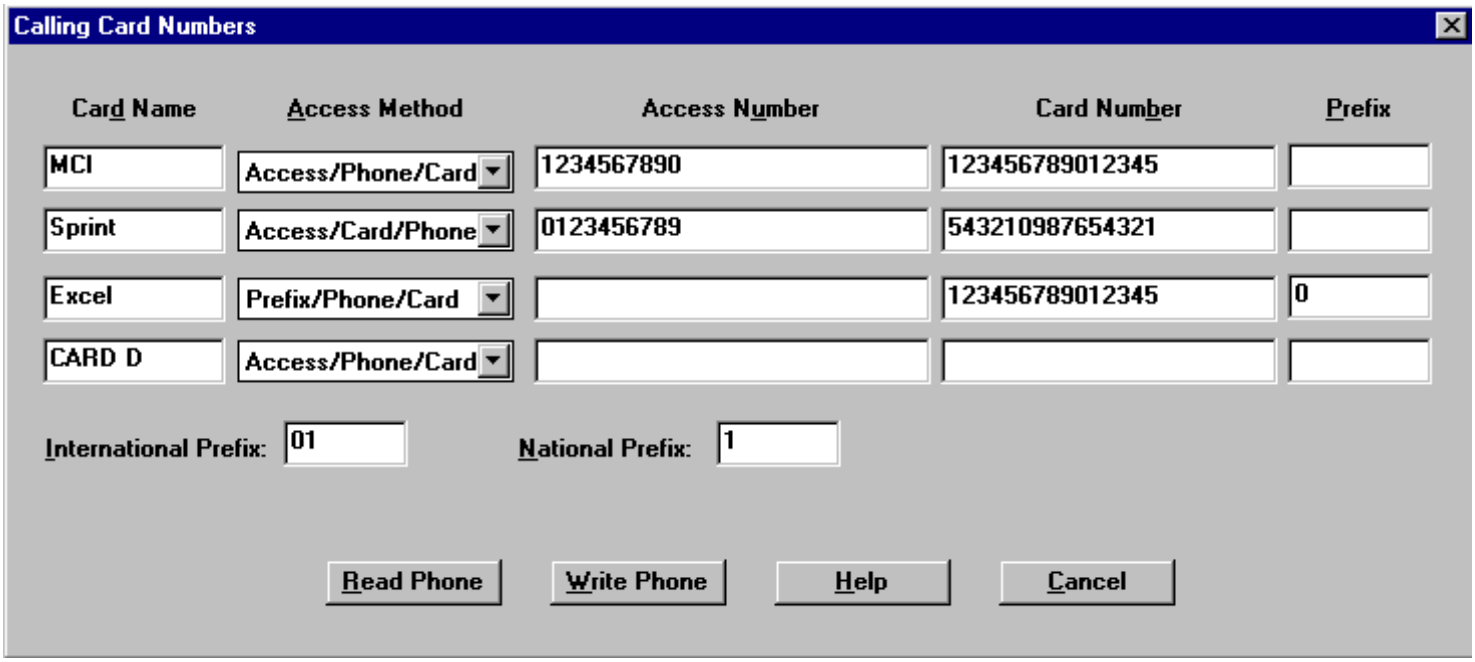
Read Phone

Reads phone contents to screen.

Write Phone

Writes contents of screen to phone.

Calling Cards



This option allows the user to program the calling card information into the phone.

Card Name

Allows user to change the name of the calling card display in the phones menu.

Access Method

Allows user to select the appropriate method for connecting with the service providers network according to the calling card requirements. Please contact your service provider for details or the calling card instructions. Changing this setting causes the phone to execute the sequence of events according to option choosen.

- Access/Phone/Card – sends the service providers Access number, then the Phone number being dialed by user, then Calling Card number.
- Access/Card/Phone – sends the service providers Access number, then Calling Card number, then the Phone number being dialed by user.
- Prefix/Phone/Card – sends the service providers Prefix number (typically a zero), then the Phone number being dialed by user, then Calling Card number

Access Number

The number used to access the service provders network. Typically a toll free number.

Card Number

Also known as “card ID”, this number is the actual calling card number issued by the service provider.

Prefix

This number is sent to gain system access. Typically a zero.

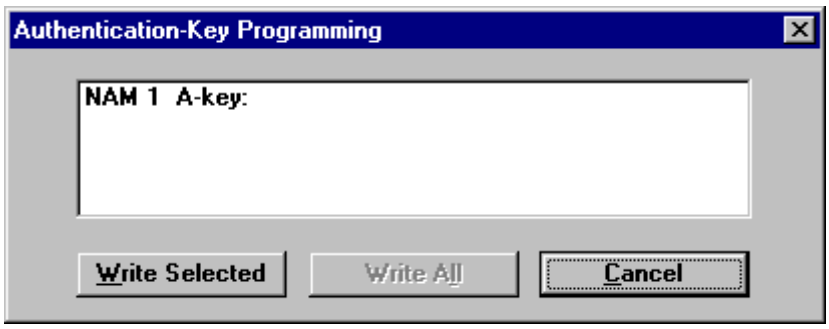
International Prefix

Currently not used.

National Prefix

Currently not used.

Authentication Key (A–Key) Programming



This option allows you to program the Authentication key of the phone. The A–key can *never* be read from the phone, only programmed to the phone over writing the previous value.

To program the A–key a valid A–key plus a valid checksum must be entered as one complete number.

- Valid A–Key number= 6 to 20 digits (e.g. XXXXXXXXXX)
- Valid checksum = 6 digits (e.g. YYYYYY)

Example:

- A–Key Entry would be XXXXXXXXXXYYYYYY

Keys:

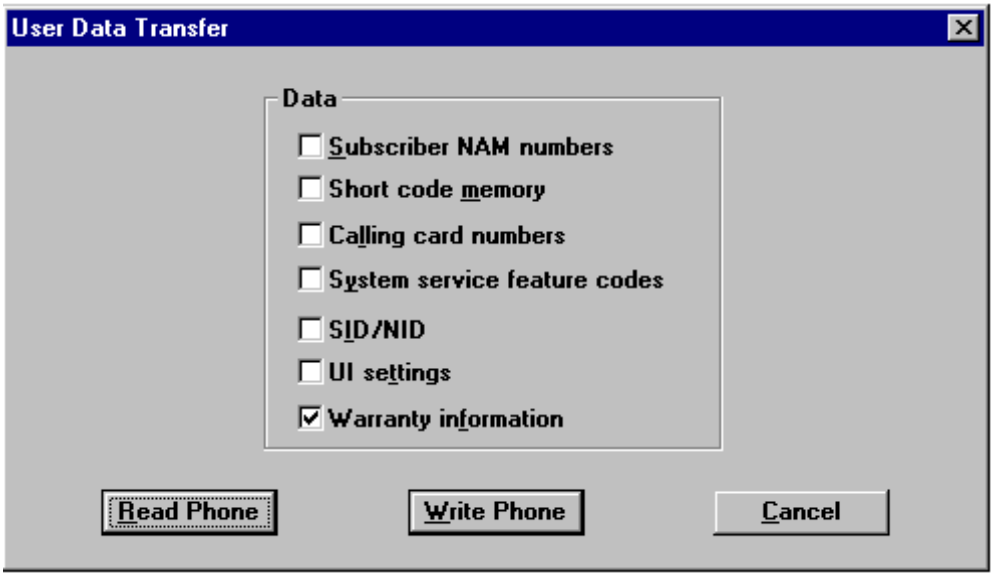
Write Selected

Writes the highlighted selection to the selected NAM in the phone if A–Key is valid. Otherwise an error message is displayed.

Write All

Writes both A–Key numbers to the corresponding NAM of the phone if the A–Key is valid. Otherwise an error message is displayed.

User Data Transfer



This option allows you to transfer the selected user data from one phone to another.

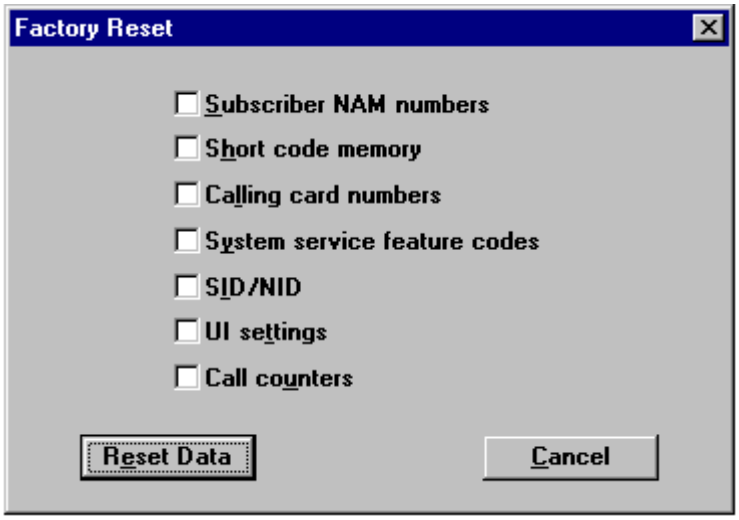
***NOTE**: The Warranty Information can not be unchecked and will always be transferred. The information can on;y be transferred to a phone once. After that an error dialog is displayed.*

If a phone should need to be replaced at the point of return, this option will read the selected information from the defective phone, allow the user to change to a new (replacement) phone, and write the users data into the replacement unit.

Steps involved

- With phone powered on, Connect defective unit and click on **"Read Phone"**.
- Disconnect defective unit.
- Connect replacements unit and power on.
- Click on **"Write Phone"**.

Set Factory Values



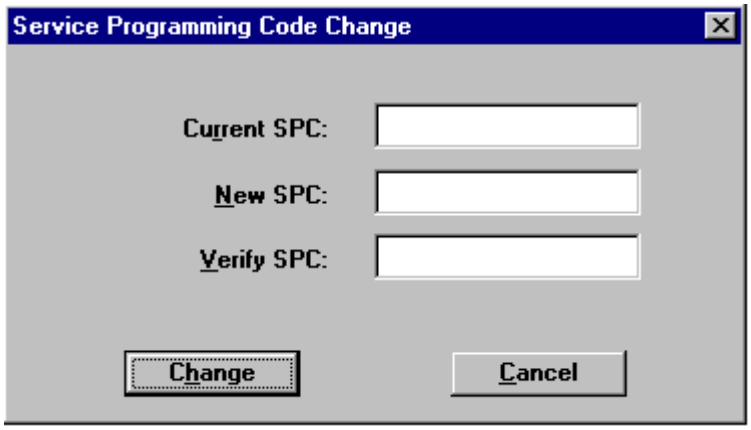
This option allows you to reset a phone's settings to their initial (factory) default values. The phone is also re–product profiled based on the product code.

The following list is a subset of data which can be reset to factory defaults:

– NAM information
– Clear Short Code Memory
– Calling Card information
– System Feature Codes
– System ID lists
– User Menu Settings
– Call Counters (except Life time counter)

NOTE: *This option will NOT erase any calibrated values within the phone.*

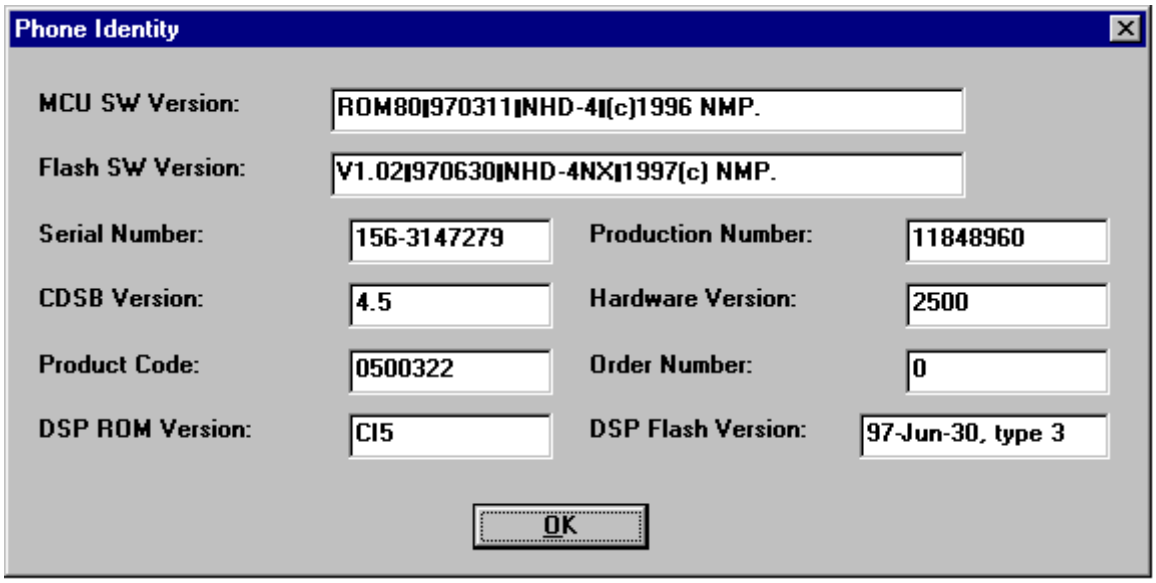
SPC code change



This option allows you to change the Subscriber Programming Code (SPC) if the original code is known.

View Menu

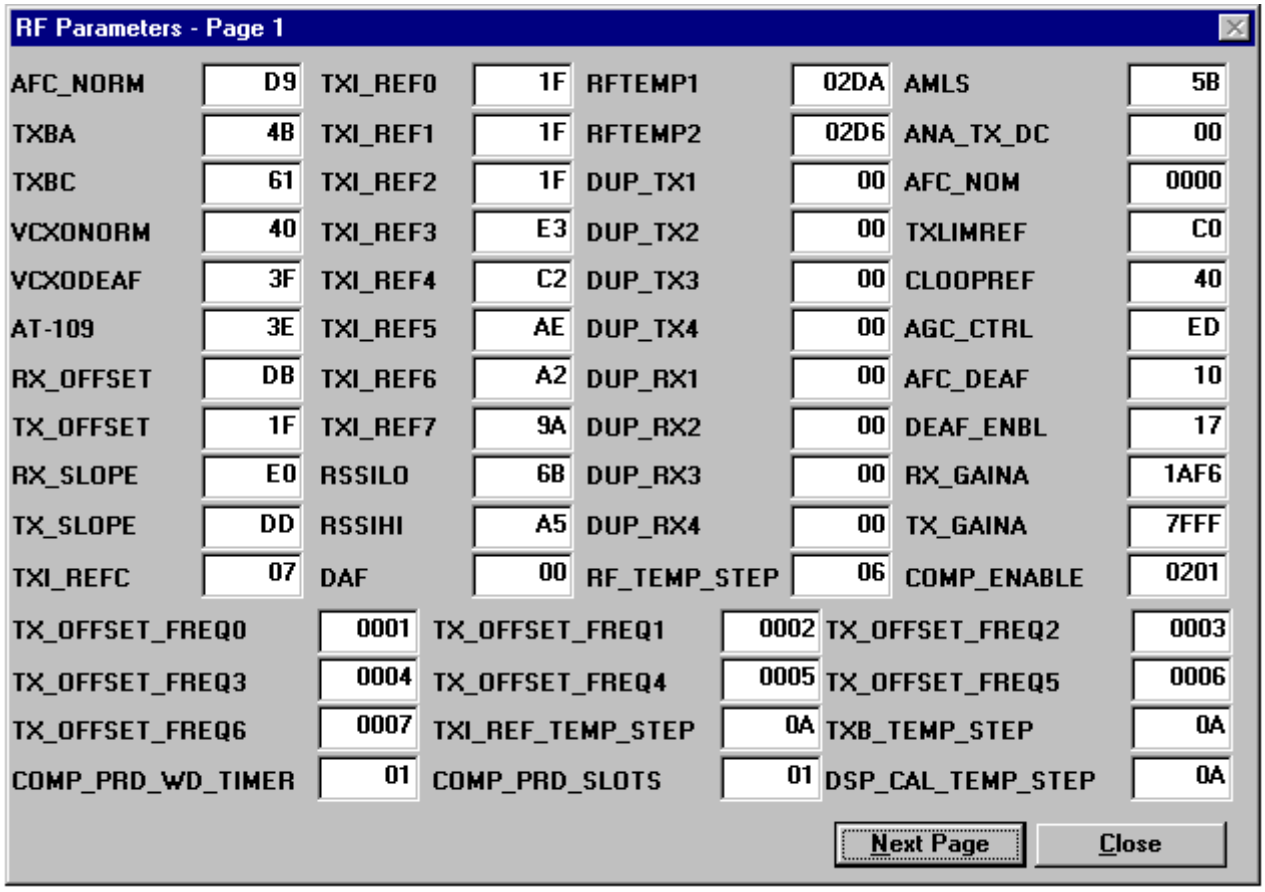
Phone Identity



This option displays the following phone identity fields:

– ROM version
– Flash version
– Production Serial Number (PSN),
– Order Number,
– Product Code,
– Hardware ID.

RF Parameters



This dialog shows the RF parameters of the phone. Looking at these parameters can help the technician in making decisions about the status of the phone.

Help

Index

A comprehensive list of all WinTesla features, hypertext linked.

General Help (F1)

This option contains two options:

– Help on using WinTesla

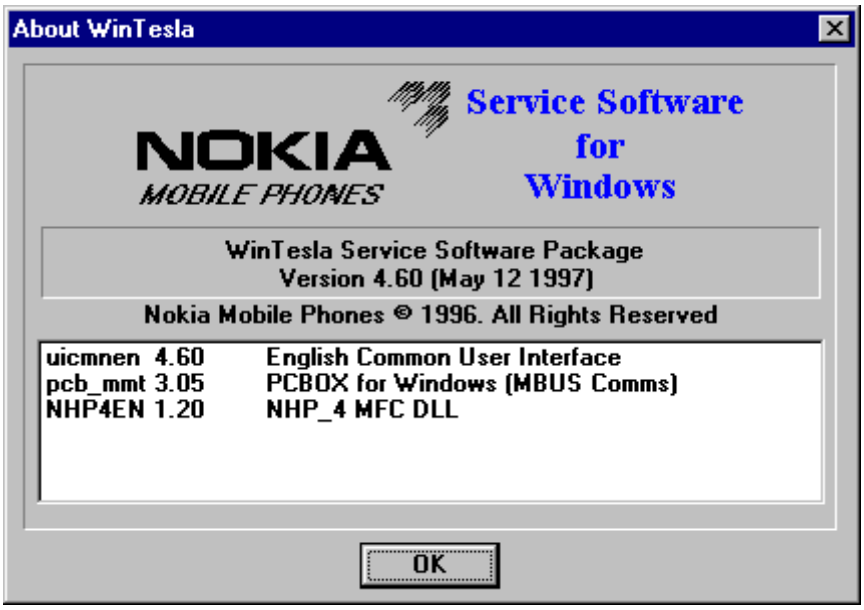
– Help on using Help

Using Help

This option provides you with information on using the online help function.

About WinTesla

Displays information on the the version that is running.



Common Problems

This section is a reference of known commo problems that may be encountered when working with the Wintesla software package.

Setting up the computer Hardware

In order to avoid some common hardware problem, please ensure the computer hardware is set up as follows.

COM Port Set up

COM port address (COM1 or COM2) should be set as the default values for these ports. Special port address or IRQ settings may encounter problems. to test this case set up a COM port as the default values and try running the Wintesla application again.

Printer port set up

The printer port is used to attach the PKD–1 software Protection Key. This device should work properly with most printer port settings. However, if a problem is encountered, change the computer printer port (LPT–1) setting to **"Standard AT type"**. This is NOT a Bi–directional setting.

***NOTE**: When using an FPS–3C flash programming set, the printer port MUST be set as **"Standard AT Type"**. The Flash box (FPS–3C) must have power connected.*

Common Errors

Error – Functionality DLL not found

This error will be encountered if a phone is connected to WIntesla and it is not recognized.

Solution

Install the Service Module for the phone type connected to Wintesla. Contact your local Nokia vendor for information on how to obtain this Service Module.

Error – PKD–1 not found

PKD–1 is the software **P**rotection **K**ey **D**evice that is required for the Wintesla application to run. This error will be encountered if the PKD–1 device is not installed on your printer port (LPT–1).

Solution

Attach the PKD–1 to the printer port (LPT–1) of the PC running Wintesla.

Error – System hangs or Locks up

Wintesla may hang or Lock up if it is being run on Windows 95 or NT.

Solution

Run the Wintesla application on Windows 3.1 or 3.11. The Wintesla application is NOT designed to run under Windows 95 or NT. If you are using Windows 3.1 or 3.11 and are still experiencing problems please call your local Authorized Service & Support location.

Error – Reset FPS–3 box

This error only occurs when reflashing a phone with new software.

Solution

Remove power from the FPS–3C box for approximately 5 seconds. Then reconnect power.

Error – Phone will not Tune properly

The phone can not be properly Tuned while connected to the FPS–3C flash box. The voltage coming from the box will cause errors in the tuning parameters.

Solution

Disconnect the FPS–3C box from the phone while Tuning. Only use one of the set up configurations listed in the Dealer Setups section of the NHD–4NX Service Manual.

Service and Support

Please contact your local Service location for more information and support .

Or try our web site (http://www.Nokia.com)

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